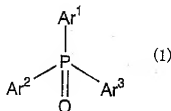


## CLAIMS

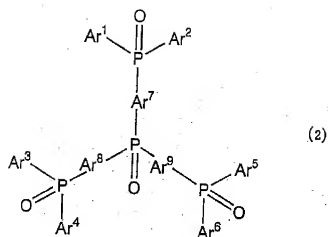
1. An organic electroluminescent element comprising an anode, a cathode and a plurality of organic compound layers sandwiched between the anode and cathode, the organic compound layers including: a hole-transporting layer made of an organic compound insoluble in alcohols; and an electron-transporting layer formed on the hole-transporting layer by a wet method, the electron-transporting layer being made of a phosphorus-containing organic compound soluble in the alcohols.
2. The organic electroluminescent element according to claim 1, wherein the phosphorus-containing organic compound is a nonionic organic compound.
3. The organic electroluminescent element according to claim 1, wherein the phosphorus-containing organic compound has a molecular weight of 300-5000.
4. The organic electroluminescent element according to claim 1, wherein the phosphorus-containing organic compound is represented by the general formula (1):



wherein Ar<sup>1</sup>-Ar<sup>3</sup>, the same or different from each other, represent an aromatic ring residue optionally containing a substituent.

5. The organic electroluminescent element according to claim 1, wherein the phosphorus-containing organic compound is represented by the general

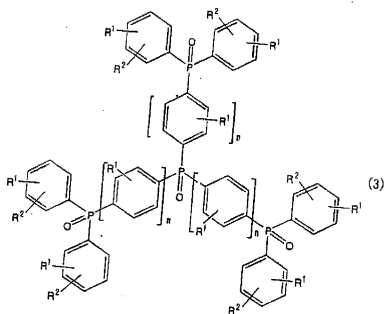
formula (2):



wherein Ar<sup>1</sup>-Ar<sup>6</sup>, the same or different from each other, represent an aromatic ring residue optionally containing a substituent; and Ar<sup>7</sup>-Ar<sup>9</sup>, the same or different from each other, represent an arylene group optionally containing a substituent.

6. The organic electroluminescent element according to claim 1, wherein the phosphorus-containing organic compound is represented by the general

10 formula (3):



wherein  $R^1$  or  $R^2$ , the same or different from each other, represents a hydrogen atom, an alkyl group, a halogen atom, cyano group, nitro group, amino group, an aryl group or a diarylphosphinyl group, and  $R^1$  and  $R^2$  can form, together with a carbon atom of a benzene ring to which they are linked, a substituted or unsubstituted aromatic ring; and  $n$  is 1 or 2.

7. A manufacturing method of an organic electroluminescent element including an anode, a cathode and a plurality of organic compound layers sandwiched between the anode and cathode, the process comprising the steps of: forming a hole-transporting layer using an organic compound insoluble in alcohols; and forming an electron-transporting layer on the hole-transporting layer by a wet method using as an electron transporting layer material a phosphorus-containing organic compound to be dissolved in an alcohol.

8. The manufacturing method of an organic electroluminescent element according to claim 7, wherein the alcohol is a linear or branched  $C_1$ - $C_6$  aliphatic alcohol.

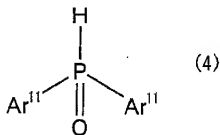
9. The manufacturing method of an organic electroluminescent element according to claim 7, wherein the phosphorus-containing organic compound is represented by the general formula (1).

5

10. The manufacturing method of an organic electroluminescent element according to claim 7, wherein the phosphorus-containing organic compound is represented by the general formula (2).

10 11. The manufacturing method of an organic electroluminescent element according to claim 7, wherein the phosphorus-containing organic compound is represented by the general formula (3).

12. A phosphorus-containing organic compound as a condensation product  
15 of a compound represented by the general formula (4):



wherein Ar<sup>11</sup>, the same or different from each other, represent a phenyl group or naphthyl group optionally substituted with a halogen atom, a lower alkyl group, a lower alkoxy group or a phenyl group, and either

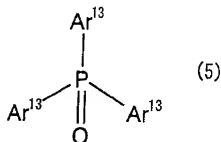
20 a compound represented by the formula:



wherein Ar<sup>12</sup> represents benzene substituted with three halogen atoms, or benzene or biphenyl substituted with two halogen atoms

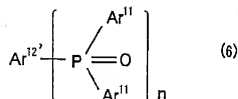
or

a compound represented by the general formula (5):



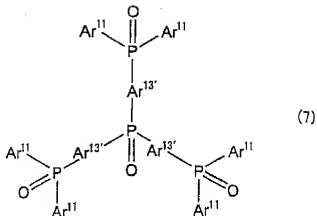
wherein Ar<sup>13</sup>, the same or different from each other, are a phenyl group or biphenyl group optionally substituted with a halogen atom, at least two of Ar<sup>13</sup> being a phenyl group or biphenyl group substituted with at least one halogen atom.

13. The phosphorus-containing organic compound according to claim 12, represented by the subformula (6):



wherein Ar<sup>11</sup> has the same meaning as defined in the general formula (4); and Ar<sup>12'</sup> represents a phenylene group or biphenylene group when n=2 and a benzenetriyl group when n=3.

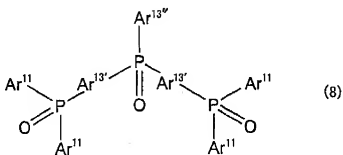
14. The phosphorus-containing organic compound according to claim 12, represented by the subformula (7):



wherein Ar<sup>11</sup> has the same meaning as defined in the general formula (4); and Ar<sup>13'</sup>, the same or different from each other, represent a phenylene group or a biphenylene group.

5

15. The phosphorus-containing organic compound according to claim 12, represented by the subformula (8):

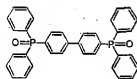


wherein Ar<sup>11</sup> has the same meaning as defined in the general formula (4); Ar<sup>13'</sup>, the same or different from each other, represent a phenylene group or a biphenylene group; and Ar<sup>13''</sup> represents a phenyl group or a biphenyl group.

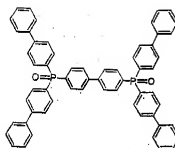
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16. The phosphorus-containing organic compound according to claim 12, selected from

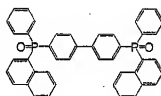
15 compounds of the subformula (6):



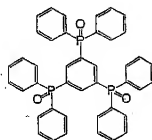
(A)



(B)

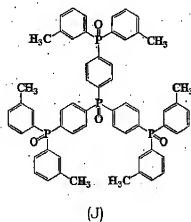
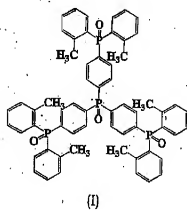
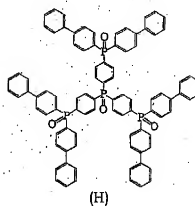
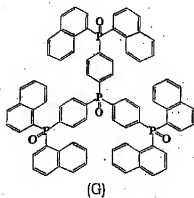
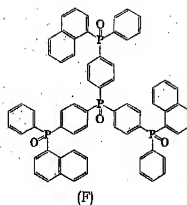
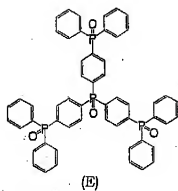


(C)

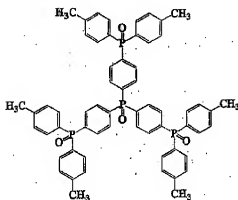


(D)

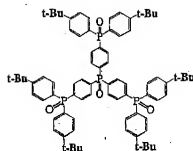
compounds of the subformula (7):



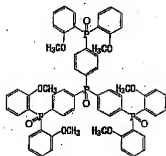




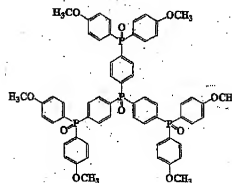
(K)



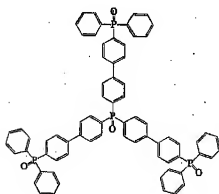
(L)



(M)



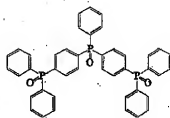
(N)



(O)

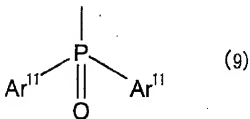
, and

compounds of the subformula (8):



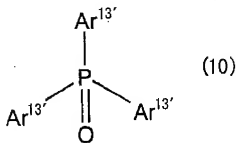
(12)

17. A phosphorus-containing organic compound having at least three partial structures represented by a diarylphosphine oxide skeleton, the
- 5 diarylphosphine oxide skeleton represented by either the formula (9):



(9)

wherein Ar<sup>11</sup> has the same meaning as defined in the general formula (4) or the formula (10):

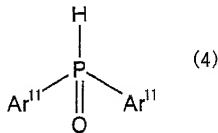


(10)

- 10 wherein Ar<sup>13'</sup>, the same or different from each other, are a phenyl group or a biphenyl group, or a phenylene group or biphenylene group linked to the formula (9).

18. A manufacturing method of a phosphorus-containing organic

compound, comprising the step of condensing, in a solvent, in the presence of a condensing catalyst and a base, a compound of the general formula (4):



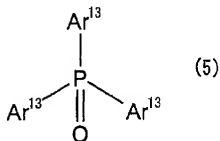
wherein Ar<sup>11</sup> has the same meaning as defined in the general formula (4), with  
5 either a compound of the formula:



wherein Ar<sup>12</sup> has the same meaning as defined in the above formula Ar<sup>12</sup>

or

a compound of the general formula (5):



10

wherein Ar<sup>13</sup> has the same meaning as defined in the general formula (5).

19. The manufacturing method of a phosphorus-containing organic compound according to claim 17, wherein the solvent is dimethyl sulfoxide, the  
15 condensing catalyst is palladium acetate or a complex compound of palladium acetate with either 1,3-bis(diphenylphosphino)propane or 1,4-bis(diphenylphosphino)butane, and the base is a trialkylamine, N-ethyl-diisopropylamine, or N,N'-dimethylaminopyridine.

20